Soldier Sensor Systems for Precision Strike

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Agenda

- Definitions
- Products
- Scenarios
- Transition to the Future
- Conclusion

A Perspective on Precision Strike

- The US Military Is Implementing an Operational Concept Where Early-Entry & Light Forces Rely on Precision Strike to Augment the Lethality Previously Associated With Heavy, Direct-Fire Weapons.

- An Effective Precision Strike System Requires:
  - Precision Targeting Sensors
  - Precision Munitions
  - Digital C4I
  - Efficient Tactics, Techniques and Procedures

- Sustained and Coordinated Development of of All of These Elements Is Required to Achieve the Promise of Precision Strike

- PM SEQ's Primary Role Is to Develop Precision Targeting Sensors for Dismounted Soldiers.

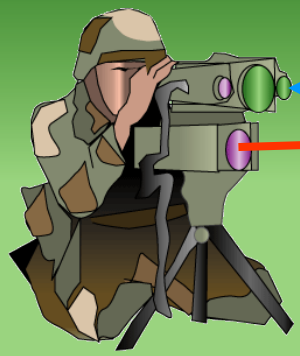
Our Products: Targeting Sensors

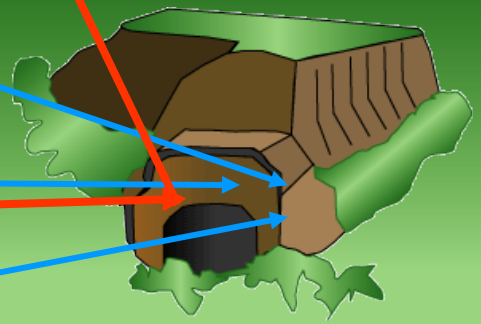
- Laser Target Location
  - Hand-held or Weapon or Tripod Mounted
  - Laser Rangefinder (LRF), Max Range Thousands of Meters
  - Azimuth, Elevation, and Self Location Measurement
  - Provides Target Location Coordinates
  - Does Not Guide Laser Guided Munitions
  - Typically Eye Safe

- Laser Target Designation
  - Tripod Mounted
  - High Power Laser
  - Coded Laser Sequence, Matched to Munition
  - Guides Laser Guided Munitions
  - NEVER Eye Safe

MARK VII/VIPER
Hand Held
Target Locator (5 km)

LLDR
Tripod Mounted
Target Locator (10 km)
& Laser Designator



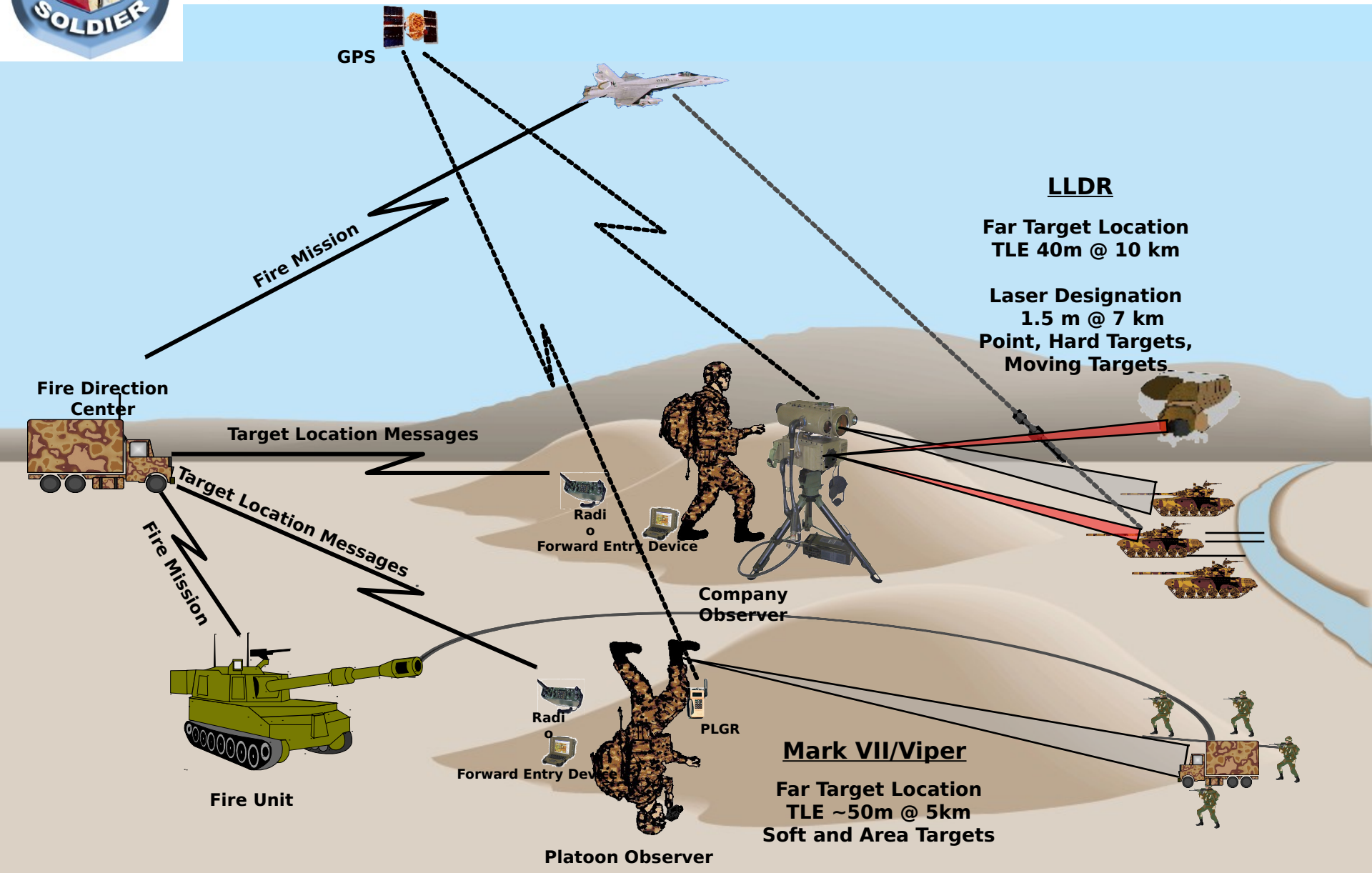


STORM
Weapon Mounted
Target Locator (2 km)
Laser Illuminator & Pointer
(AKA Marking)

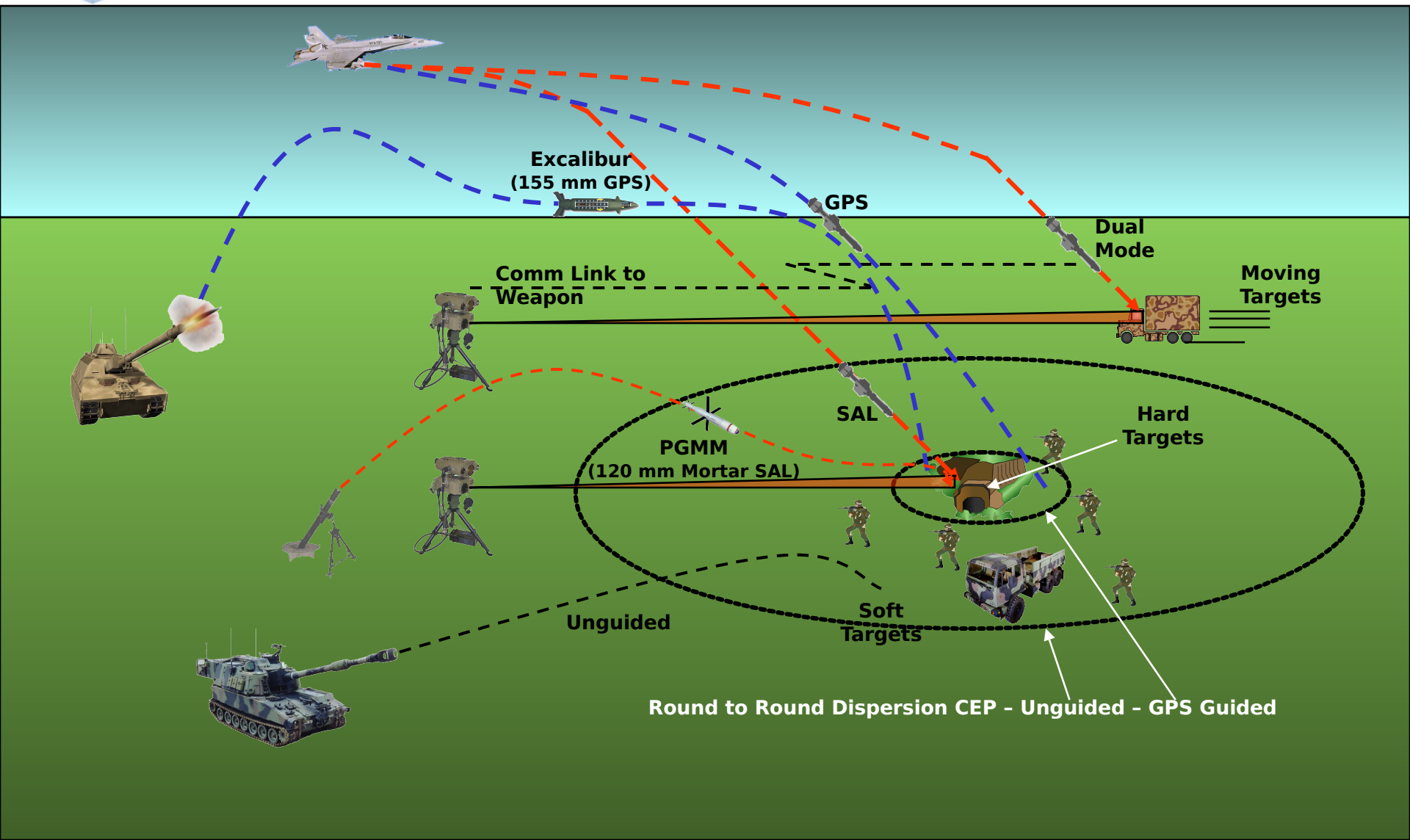
What Do We Have Now?

Weapon Mounted Target Locator & Laser Pointer STORM	Day Target Location – 50 m @ 2.5 km Visible and Infrared Laser Pointers
Handheld Target Locators Viper, Mark VII	Day Target Location – 50 m @ 5 km Night Target Location – 20 m @ 0.5 km Eye-Safe Rangefinder Direct-View Optics Image Intensifier Tube Night Vision
Crew-Served Target Locator & Laser Designator LLDR	Day Target Location – 20 m @ 5 km Night Target Location – 20 m @ 5 km Eye-Safe Rangefinder Laser Designator Day Camera Thermal Night Vision Camera
Tactical Image Transmission & Flexible Communications LVRS	Protocols -PTAC, MIL-STD-188-184, and SMRS Digital Connectivity - RS-234/422, SLP Compatibility - Multi-Service (USASOC, SEALS, Air Force, Coast Guard)

Today's Targeting Scenario



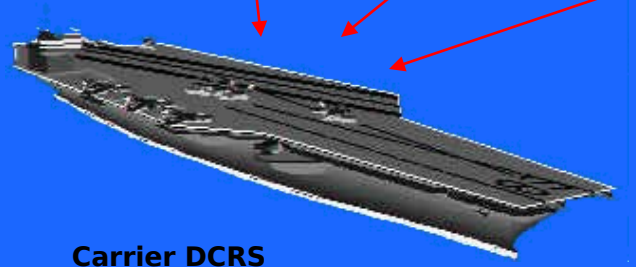
Future Precision Strike Scenarios



LVRS - LLDR

Tactical Scenario

F/A-18 Strike

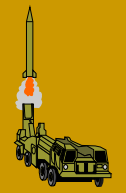


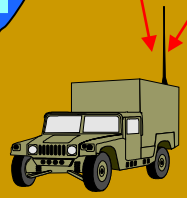
Carrier DCRS

F-14 FTI LANTIRN
Precision Strike FAC (A)

AH-64 Strike

LVRS MMR/LLDR
Forward Observer





LVRS Base
Station TOC

Targets

LVRS Sends Near Real Time Video and Targeting Data to Aircraft Equipped with Fast Tactical Imagery, Increasing Light Force Effectiveness and Survivability.

Transition to Future Sensors

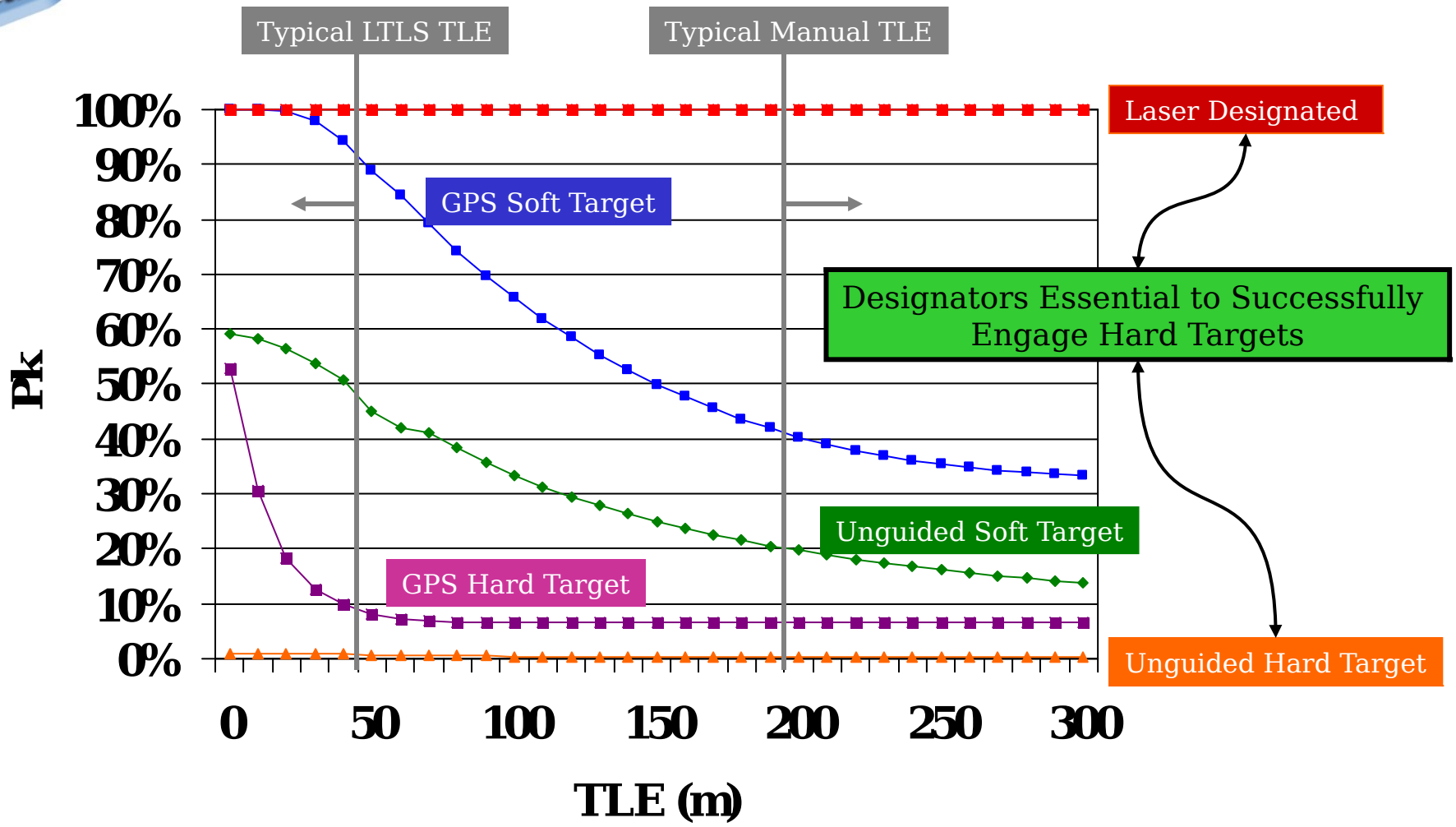
	Current	Technology Insertion	Future
Laser Target Locator	Viper Mark VII LLDR TLM	TWS Thermal Imaging Module TALON Compass/TLE Improvements Cooled Mega-Pixel FLIR	Objective Dismounted Optic Objective LLDR TLM
Laser Designator	LLDR LDM	Ultra-Lightweight Designator Illuminated Short Wave IR Imager (Long Range Identification)	ULD-2 (Shown with TALON Day) Objective LLDR LDM Identification/ Designation Module

Conclusion

- Precision Strike is Key to Achieving Lethality without Sacrificing Strategic Mobility
- To be Effective we Need a Complete System, Especially for Light Forces
- To Realize the Potential of Precision Strike we Must Keep Focused on the Total System Until it is Fully Deployed
- PM SEQ Has the Supporting Sensors Required to Make Precision Strike Effective

Backups

Why Accurate Sensors Are Important to Precision Strike
(TLE vs Probability of Kill for 4 Round Engagement)



Impact of Target Location Error (TLE)

- ***Automated TLE ≤ 50m; Manual TLE ≥ 200m***
- ***Unguided Weapons + Auto TLE Marginally Effective***
- ***Unguided Munitions + Auto TLE = GPS Munitions + Manual TLE***
- ***Good TLE and GPS Munitions = 1st Rd Fire For Effect on Soft Targets***
- ***When Firing Volleys on Soft Targets, TLE ≤ 20 m is Sufficient***
- ***Both GPS and Unguided Munitions Are Ineffective Against Hard Targets at 0 TLE; Designators Are Required***
- ***If You Want to Kill Moving Targets, Use Dual Mode Weapons (Laser / GPS) with Real Time In Flight Update***

Impact of Precision strike
with Good (50 m) TLE

ROM Probability of Kill						
	Stationary Soft Target			Stationary Hard Target		
Rounds Fired	1 Rd	2 Rds	4 Rds	1 Rd	2 Rds	4 Rds
Unguided	~15%	~25%	~45%	< 1%	< 1%	< 1%
GPS	~40%	~60%	~85%	~2%	~4%	~8%
Designated	~85%	~100%	~100%	~85%	~100%	~100%

Note: Probability of Kill shown above are approximate order of magnitude estimates.

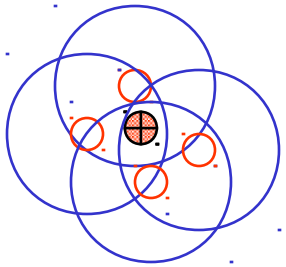
- ***Laser Target Locators & GPS Guided Weapons Allow Light Forces to Kill Soft Targets Efficiently***
- ***Designators Allow Light Forces to Kill Hard Targets Using Indirect Fire***
- ***Designators Allow Light Forces to Kill Moving Targets (Soft or Hard) Using Indirect Fire Support***
- ***Dual Mode (Laser / GPS) Munitions with Real Time In Flight Update Significantly Improves Performance Against Moving Targets***

Impact of Target Location Error (TLE)

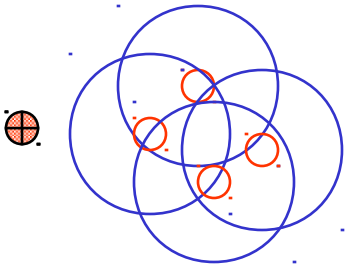
GPS Guided Weapons

Laser Guided Weapons

Good TLE, Tight Dispersion



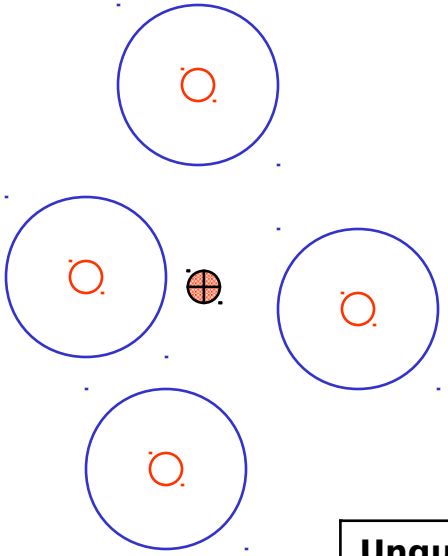
Bad TLE, Tight Dispersion



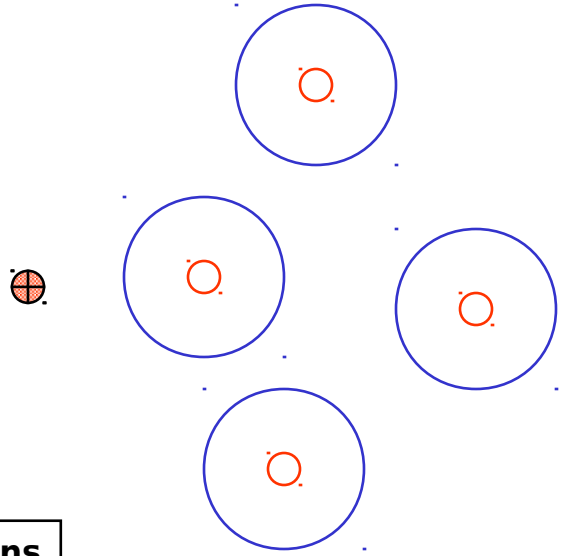
Good TLE is Critical for GPS Guided Weapons

Designated Weapon Required to Kill Hard Targets

Good TLE, Broad Dispersion



Bad TLE, Broad Dispersion



Good TLE Provides Marginal Benefit for Unguided Weapons

Unguided Weapons

Legend